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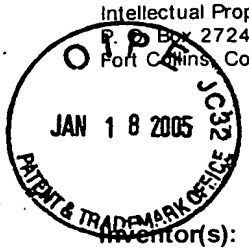
PATENT APPLICATION

ATTORNEY DOCKET NO. 10010736-1



IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Kenneth Kay Smith

Confirmation No.: 3658

Application No.: 09/931,776

Examiner: Guy J. Lamarre

Filing Date: 08-16-2001

Group Art Unit: 2133

Title: Dynamic Variable-Length Error Correction Code

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Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on **11-16-2004**.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

( ) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

( )	one month	$120.00
( )	two months	$450.00
( )	three months	$1020.00
( )	four months	$1590.00

( ) The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **08-2025** the sum of **$500.00**. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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Respectfully submitted,

Kenneth Kay Smith

By _____

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Kenneth Kay Smith	§	Group Art Unit:	2133
Serial No.:	09/931,776	§	Examiner:	Guy J. Lamarre
Filed:	August 16, 2001	§		
For:	Dynamic Variable-Length Error Correction Code	§	Atty. Dkt. No.:	HPC.0164US (10010736-1)

Mail Stop **Appeal Brief-Patents**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF PURSUANT TO 37 C.F.R § 41.37

Sir:

The final rejection of claims 3-11, 13, 14, 16-24, 26, 27, and 29 is hereby appealed.

I. REAL PARTY IN INTEREST

The real party in interest is the Hewlett-Packard Development Company, L.P., by virtue of the assignment recorded at reel/frame 014061/0492.

II. RELATED APPEALS AND INTERFERENCES

None.

Date of Deposit: January 14, 2005

I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as **first class mail** with sufficient postage on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313.

Ginger Yount

Ginger Yount

III. STATUS OF THE CLAIMS

Claims 3-11, 13, 14, 16-24, 26, 27, and 29 have been finally rejected and are the subject of this appeal. Claims 1, 2, 12, 15, 25, and 28 have been cancelled.

IV. STATUS OF AMENDMENTS

An Amendment Under § 41.33 & 1.116 (hereinafter "§ 116 Amendment") is submitted herewith. In response to the previously submitted proposed Amendment, the Advisory Action dated October 29, 2004, indicated that the previously submitted proposed Amendment would not be entered because the Amendment did "not exclusively correct informalities raised in the final office action." 10/29/2004 Advisory Action at 2.

Entry of the attached § 116 Amendment is requested because it removes issues from appeal (by canceling claims), and because it addresses a minor objection of claim 24 raised in the Office Action (by adding a period to the end of the claim). Also, claim 26 has been merely rewritten into independent form. *See* 37 C.F.R. § 41.33 ("Amendments filed after the date of filing an appeal . . . and prior to the date a brief is filed pursuant to § 41.37 may be admitted as provided in § 1.116 of this title."). Section 1.116(b) provides that (1) an amendment may be made canceling claims or complying with any requirement of form expressly set forth in a previous office action; or (2) an amendment presenting claims in better form for consideration on appeal. The rewriting of claim 26 into independent form does not affect any other dependent claim, as no claim depends from claim 26.

As the § 116 Amendment complies with §§ 1.116 and 41.33, it is requested that the § 116 Amendment be entered for consideration on appeal.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 3 recites a method that comprises associating an initial error correcting code with a redundancy defined within a data storage device, and replacing the initial error correcting code with an updated error correcting code.

Independent claim 9 recites a method that comprises defining a payload and a redundancy within a storage device, the payload to the payload plus redundancy defining a ratio. The method of claim 9 further includes dynamically altering the ratio to change an amount of the redundancy, and tracking time and usage of the data storage to determine if the ratio results in sufficient redundancy.

Independent claim 13 recites a system that comprises a technology type determination module to report a technology of a storage device so that an initial error correcting code will be more appropriately selected. The system further includes an update error correcting code assignment module to assign an updated error correcting code to replace the initial error correcting code in response to a changed error rate, and an error correcting code library containing at least two error correcting codes from which the update error correcting code assignment module may select.

Independent claim 21 recites a computer-readable medium having computer-executable instructions thereon which, when executed, perform acts comprising associating an initial error correcting code with a redundancy defined within a data storage device, and associating an updated error correcting code with the redundancy in response to a change in an error rate associated with the data storage device. The acts further include moving a divider, defined between the redundancy and a payload within the data storage device, to provide space required by redundancy data associated with the updated error correcting code.

Independent claim 22 recites a computer-readable medium having computer-executable instructions thereon which, when executed, perform acts comprising monitoring an error rate of a storage device, and dynamically altering a ratio of a redundancy to a payload to provide a level of redundancy appropriate to the error rate.

Independent claim 23 recites a method of initial error code correction assignment at a manufacturing facility that includes locating a divider segregating a payload and a redundancy portion of a data structure in a storage device, and allocating the redundancy portion by moving the divider. The method further includes assigning an initial error code correction to the redundancy portion.

Independent claim 26 recites a method of updating an error code correction assignment for an end-use device that comprises determining a need to install a substitute error code correction assignment for the end-use device, and selecting the substitute error code correction assignment on an as-needed basis. The method further includes changing the location of a divider to accommodate the substitute error code correction for the end-use device. Determining a need to install a substitute error code correction assignment includes tracking errors, monitoring media age and use levels, and performing self-testing to evaluate memory condition for the end-use device.

Independent claim 27 recites a method of determining an initial segregation between a payload and redundancy associated with a data structure of a storage device, the method comprising determining a technology type of the storage device, performing a memory test on the storage device and recording a result of the memory test, and determining a use to which the storage device will be put. The method further includes selecting an error code correction based on the determinations and memory test, and segregating the data structure to accommodate the error code correction.

Independent claim 20 recites a system comprising an ECC library that contains at least two error correcting codes, and an initial error correcting code assignment module to assign an initial error correcting code from the ECC library appropriate to an expected initial error rate.

The system further includes a technology type determination module to determine a technology of a storage device and to report the technology to the initial error correcting code assignment module, and an application determination module to determine an application to which the storage device will be put and to report to the initial error correcting code assignment module. An update error correcting code assignment module assigns an updated error correcting code from the ECC library appropriate in response to a changed error rate, and a storage device memory test module performs a memory test on the storage device and report to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made. An error tracking, recording and analysis module reports information on errors made by the storage device to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made. An age and use tracking module reports information on an age and use level of the storage device to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made, and an application tracking module reports changes in an application to which the storage module is being used to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made.

As described in the Specification of the present application, in a storage device, different portions of the storage device can be allocated to store data ("payload") and to store an error correction code ("redundancy"). While redundancy provides for greater data integrity, the redundancy also adds overhead that results in additional storage costs and processor time. Specification, p. 1, lines 10-14.

According to some embodiments of the invention, a divider (such as divider 106, 108, or 110 shown in Fig. 1 of the application) segregating the payload and redundancy portions of a

storage medium may be dynamically allocated such that the size of the redundancy and strength of an error correction code (ECC) may be selected appropriately in response to changing conditions. In the course of manufacturing data storage media, the technology type, results of testing, and use to which the data storage media is to be put, are considered to decide the strength of the ECC required. Based on the ECC selected and its space requirements, the relative sizes of the payload and redundancy portions can be selected. Specification, p. 6, lines 5-18.

After the storage medium is installed in a system or device, degradation of the storage medium may occur over time. In response to error detection, media age and use levels are monitored, and memory tests can be run. In response to changes in memory reliability, the size of the redundancy portion of the storage medium relative to the payload portion may be changed, and a more appropriate ECC can be substituted. Specification, p. 6, lines 19-27.

Figs. 1 and 2 of the application show storage portions with dividers to divide data portions and redundancy portions. Different dividers, to provide different redundancy sizes (and thus different ECC codewords) can be used to achieve different fundamental error rates. Specification, p. 7, line 7-p. 8, line 26.

Fig. 5 of the application shows an embodiment of an initial ECC assignment module 500 that is typically operational within a manufacturing facility 501 where a storage device 201 is manufactured. The initial ECC assignment module initially locates the divider segregating the payload and redundancy portions of the storage device 201. Once the space for the redundancy portion has been allocated, assignment of ECC is made. The ECC assignment is based on an initial determination of storage device technology, a memory test, and a determination of the use or application to which the storage device will be put. Specification, p. 12, lines 8-18.

Fig. 6 of the application shows an update ECC assignment module 600 that is adapted to operate within an end-use device 601, such as a digital camera or other device. The update ECC assignment module tracks errors, monitors media age and use levels, performs self-testing, and acts upon other factors relevant to evaluating memory condition. When needed, the update ECC assignment module selects a substitute ECC from an ECC library, and the update ECC assignment module changes the location of the divider to adjust the size of the redundancy portion. Specification, p. 14, lines 12-22.

By using some embodiments of the invention, a technique is provided to dynamically alter the segregation between payload and redundancy portions of a storage medium to allow replacement of ECC in response to changes in conditions, such as the fundamental error rate, change in use of the storage medium, change in age of the storage medium, or other factors. Specification, p. 15, line 26-p. 16, line 11.

Although some embodiments of the invention have been described above, it is contemplated that other embodiments are also within the scope of the claims on appeal.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Claims 3-5, 7, 21-24, 26, 27, And 29 Were Rejected Under 35 U.S.C. § 103 Over U.S. Patent No. 6,477,669 (Agarwal) Alone.

B. Claims 6, 8-11, 13, 14, And 16-20 Were Rejected Under § 103 Over Agarwal In View Of "Admitted prior art" (APA).

VII. ARGUMENT

A. Claims 3-5, 7, 21-24, 26, 27, And 29 Were Rejected Under 35 U.S.C. § 103 Over U.S. Patent No. 6,477,669 (Agarwal) Alone.

1. Claims 3, 4.

Claim 3 was rejected as being obvious over Agarwal alone.

To establish a *prima facie* case of obviousness, the Examiner has the burden of establishing that there was some motivation or suggestion, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the teachings of Agarwal. *See* M.P.E.P. § 2143 (8th ed., Rev. 2), at 2100-129. Appellant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness of claim 3 over Agarwal.

As conceded by the Examiner, Agarwal does not disclose associating an initial error correcting code with a redundancy defined within a data storage device. 6/29/2004 Office Action at 3. The Examiner correctly noted that the error correction technique described in Agarwal is applied to data transmission. *Id.* In fact, the error correction technique of Agarwal is applied to wireless communications, in which the quality of the wireless communications link can vary based on atmospheric conditions. Agarwal, 3:59-62; 7:43-50. There is absolutely no suggestion provided anywhere within Agarwal of applying its error correction technique to a data storage device.

The only support provided by the Examiner regarding obviousness of claim 3 over Agarwal is the following conclusory statement: "As is known in the art, data storage and data communication use similar techniques to ensure the error free communication (read/write) of codewords." 6/29/2004 Office Action at 3. The Examiner did not provide any objective proof that would indicate that a person of ordinary skill in the art would have been motivated to modify the Agarwal system to achieve the claimed invention. Without the objective proof that would establish the necessary suggestion or motivation to modify the teachings of Agarwal, the obviousness rejection is clearly defective.

In the 10/29/2004 Advisory Action, the Examiner cited case law for the proposition that the suggestion or motivation to modify Agarwal does not have to be found in the references themselves but also can be found in the knowledge generally available to one of ordinary skill in the art. However, the Examiner did not cite to any evidence that would establish the content of this knowledge that is generally available to one of ordinary skill in the art. All the Examiner provided was a one-sentence conclusory statement: "data storage and data communication use similar techniques to ensure the error free communication (read/writes) of codewords." This statement is without any evidentiary support. As stated by the M.P.E.P. itself, "it is **never** appropriate to rely solely on 'common knowledge' in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based." M.P.E.P. § 2144.03, at 2100-137 (emphasis added) (citing *In re Zurko*, 258 F.3d 1379, 59 U.S.P.Q.2d 1693 (Fed. Cir. 2001)). As held by *In re Zurko*,

> [T]he Board cannot simply reach conclusions based on its own understanding or experience—or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point to some concrete evidence in the record in support of these findings. *In re Zurko*, 258 F.3d at 1386.

The Examiner has simply failed to satisfy the requirement that the assessment of common knowledge must have substantial evidentiary support. *In re Zurko*, 258 F.3d at 1385. Without the required evidentiary support for the Examiner's allegation of common knowledge, the obviousness rejection is defective, and the Examiner has failed to establish a *prima facie* case of obviousness.

For the foregoing reasons, it is respectfully requested that the final rejection of the above claims be reversed.

2. Claim 5.

Claim 5, which depends from claim 3, was also rejected as being obvious over Agarwal alone. Claim 5 is allowable for at least the same reasons as claim 3.

Moreover, with respect to dependent claim 5, Agarwal does not provide any teaching or suggestion of "reorganizing an address space shared by a payload and the redundancy to provide space required by the updated error correcting code within the redundancy." The Office Action dated June 29, 2004, cited to no passage in Agarwal to support its allegation of obviousness, nor did the Office Action cite to any other prior art reference. The Office Action merely provided a conclusory statement that the features of claim 5 would be obvious to a person of ordinary skill in the art.

In response to Appellant's arguments made in response to this rejection, the Examiner in the 10/29/2004 Advisory Action cited the following passage in Agarwal:

> The inventive method includes the steps of calculating a byte error rate associated with communication signals received by the primary interface via the communication channel from the remote interface and determining a forward error correction code length of the forward error correction code based on the byte error rate. The forward error correction code length is varied in accordance with said byte error rate. The method also includes the step of transmitting the forward

error correction code length to a remote interface over the communication channel. Agarwal, 4:4-12.

This cited passage does *not* provide any teaching or suggestion of *reorganizing an address space shared by a payload and the redundancy* to provide space required by the updated error correcting code within the redundancy. The cited passage refers to varying the forward error correction code length in a transmitted frame (over a communication channel)—the concept of address space simply is inapplicable to a communication channel.

Since Agarwal fails to provide the requisite suggestion to modify its teachings to achieve the invention of claim 5, the Examiner has failed to establish a *prima facie* case of obviousness against claim 5 for this additional reason.

Therefore, reversal of the final rejection of the above claim is respectfully requested.

3. Claim 7.

Claim 7, which depends from claim 3, was also rejected as being obvious over Agarwal alone. Claim 7 is allowable for at least the same reasons as claim 3.

Claim 7 further recites additionally tracking errors made by the data storage device to determine if the initial error condition code is of sufficient strength. In the rejection of claim 7, the Examiner has ignored the language "made by the data storage device" recited in claim 7. The Examiner cited column 7, lines 35-50, of Agarwal, as teaching the subject matter of claim 7. However, the cited passage of column 7 of Agarwal refers to varying the forward error correction code to match the quality of the communication link. Agarwal provides absolutely no teaching or suggestion whatsoever of tracking errors made by a data storage device, as recited in claim 7. Therefore, the *prima facie* case of obviousness against claim 7 is defective on this further ground.

Therefore, reversal of the final rejection of the above claim is respectfully requested.

4. Claim 21.

Independent claim 21 was also rejected as being obvious over Agarwal alone.

In the rejection of claim 21 over Agarwal, the Examiner did not address at all the language "within [a/the] data storage device" (at lines 3-4 and 7-8 of claim 21) and the language "with the data storage device" of claim 21 (at line 6). 6/29/2004 Office Action at 16-17. Although the Examiner conceded that Agarwal fails to disclose instructions being implemented on a computer-readable medium that when executed perform the recited acts, the Examiner did not address the "data storage device" elements of claim 21. Applicant respectfully submits that the obviousness rejection is defective for ignoring express elements of the claim.

Clearly, Agarwal fails to teach or suggest any of the following acts:

- associating an initial error correcting code with a redundancy defined *within a data storage device*;
- associating an updated error correcting code with the redundancy in response to a change in an error rate associated *with the data storage device;* and
- moving a divider, defined between the redundancy and a payload *within the data storage device,* to provide space required by redundancy data associated with the updated error correcting code.

There is absolutely no evidence of record that would provide the requisite suggestion to modify the teachings of Agarwal to achieve any of the acts recited in claim 21. The *prima facie* case of obviousness against claim 21 is therefore defective.

Therefore, reversal of the final rejection of the above claim is respectfully requested.

5. Claim 22.

Independent claim 22 was also rejected as being obvious over Agarwal alone.

In the rejection of claim 22, the Examiner also completely ignored the language "a storage device" recited in line 3 of claim 22. Clearly, Agarwal provides no teaching or suggestion whatsoever of monitoring an error rate of *a storage device,* and dynamically altering a ratio of a redundancy to a payload to provide a level of redundancy appropriate to the monitored error rate. The Examiner has cited to no evidence whatsoever that would have provided the suggestion to modify the technique described in Agarwal to errors within a storage device. Therefore, a *prima facie* case of obviousness has not been established with respect to claim 22.

Reversal of the final rejection of the above claim is respectfully requested.

6. Claim 23.

Independent claim 23 was also rejected as being obvious over Agarwal alone.

With respect to claim 23, the Examiner has cited no actual evidence that would provide the requisite suggestion to modify the teachings of Agarwal to achieve the invention of claim 23, which relates to a method of initial error code correction assignment at *a manufacturing facility* that comprises locating a divider segregating a payload and a redundancy portion of a data structure *in a storage device.* Agarwal, which teaches varying the length of a forward error correction code depending on conditions of a wireless link, does *not* provide any teaching or suggestion whatsoever regarding initial error code correction assignment at a manufacturing facility or locating a divider segregating a payload and redundancy portion of a data structure in a storage device. A *prima facie* case of obviousness has thus not been established with respect to claim 23.

Reversal of the final rejection of the above claim is respectfully requested.

7. Claim 24.

Claim 24, which depends from claim 23, was also rejected as being obvious over Agarwal alone. Claim 24 is allowable for at least the same reasons as claim 23.

Moreover, claim 24 further recites that the initial error code correction is assigned based at least in part on an initial determination of *storage device technology,* a *memory test,* and a determination of use to which the *storage device* will be put. In the rejection of claim 24, these express elements of claim 24 were completely ignored by the Examiner. *See* 6/26/2004 Office Action at 3. Agarwal, which varies the length of the forward error correction code based on quality of a communication link, does not provide any suggestion whatsoever that an initial error code correction is assigned based at least in part of determination of storage device technology, memory test, and determination of use to which the storage device will be put. A *prima facie* case of obviousness has thus not been established with respect to claim 24 for this further reason.

Reversal of the final rejection of the above claim is respectfully requested.

8. Claim 26.

Independent claim 26 was also rejected as being obvious over Agarwal alone.

Claim 26 recites that determining a need to install a substitute error code correction assignment includes tracking errors, monitoring *media age and use levels*, and performing *self-testing to evaluate memory condition* for the end-use device. This specific language of claim 26 was completely ignored in the rejection of claim 26 on page 3 of the Office Action. Agarwal provides absolutely no teaching whatsoever of determining a need to install a substitute error code correction assignment for an end-use device that includes tracking errors, monitoring media

age and use levels, and performing self-testing to evaluate memory condition for the end-use device. Therefore, a *prima facie* case of obviousness has clearly not been established with respect to claim 26.

Reversal of the final rejection of the above claim is respectfully requested.

9. Claim 27.

Independent claim 27 was also rejected as being obvious over Agarwal alone.

Claim 27 expressly recites a method that includes determining a *technology type of the storage device,* performing a *memory test* on the storage device and recording a *result of the memory test*, and determining *use to which the storage device* will be put. Also, claim 27 recites selecting an error code correction based on the determination and *memory test*. These elements, expressly recited in claim 27, were not mentioned at all in the rejection of claim 27 on pages 1 and 2 of the Office Action. As Agarwal relates to an error correction technique applied to a wireless communications link, it is clear that Agarwal provides no teaching or suggestion whatsoever of determining a technology type of a storage device, performing a memory test on the storage device, determining a use to which the storage device will be put, and selecting an error correction based on the determinations and memory test. A *prima facie* case of obviousness has thus not been established with respect to claim 27.

Reversal of the final rejection of the above claim is respectfully requested.

10. Claim 29.

Claim 29, which depends from claim 27, was also rejected as being obvious over Agarwal alone. Claim 29 is allowable for at least the same reasons as claim 27.

With respect to claim 29, no explanation was offered by the Examiner regarding how claim 29 would be rendered obvious by Agarwal. *See* 6/29/2004 Office Action at 3. Claim 29 recites evaluating information corresponding to an error rate to determine if the error rate has increased, and reusing the storage device if the error rate is substantially constant, and updating the error correction code if the error rate has increased beyond a threshold value. Agarwal provides no teaching or suggestion of these elements of claim 29. A *prima facie* case of obviousness has also not been established with respect to claim 29.

Reversal of the final rejection of the above claim is respectfully requested.

B. Claims 6, 8-11, 13, 14, And 16-20 Were Rejected Under § 103 Over Agarwal In View Of "Admitted prior art" (APA).

1. Claims 6, 8-11.

Independent claim 9 was rejected as being obvious over the asserted combination of Agarwal and "admitted prior art" (APA). 6/29/2004 Office Action at 6.[1] To establish a *prima facie* of obviousness over multiple references, there must be some motivation or suggestion, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. *See* M.P.E.P. § 2143, at 2100-129.

Although the Examiner cited to teachings of the two references (Agarwal and APA), the Examiner did not explain what would motivate a person of ordinary skill in the art to combine the teachings of Agarwal and the APA to achieve the claimed invention. In the background section of the present application, a discussion is made that a fundamental error rate of data storage media is dependent on a number of factors, including technology type, media age,

[1] Although the introduction to paragraph 5.5 of the Office Action referred to an obviousness rejection of claim 9 over Agarwal alone, the explanatory text provided in the rejection also cited to "Spec", which refers to the "Admitted Prior Art."

number of writes/reads, and other factors that can impact the fundamental error rate. This discussion in the background of the present application focuses on the factors that are pertinent to data storage media. On the other hand, Agarwal relates to error detection and correction implemented for a wireless communications link, where error rates depend upon environmental conditions. There was absolutely no need or desirability whatsoever to incorporate the teachings provided in the background section of the present application into the Agarwal system, which does not relate to error detection and correction of data storage media. The only apparent rationale for combining the elements disclosed in the background of the present application and the elements of Agarwal is impermissible hindsight based on the disclosure of the present invention. The Examiner has failed to establish why it would be desirable to incorporate the teachings of the background section of the present application regarding error rates of storage media into the Agarwal system, which provides error detection and correction of a wireless communications link that is affected by environmental conditions.

In addition, the background section of the present application does not teach *tracking* time and usage of data storage to determine if the ratio results in sufficient redundancy. The background section explains that the fundamental error rate is based on a number of factors. However, the background section does not even remotely suggest the tracking of time and usage of data storage to determine if a ratio results in sufficient redundancy. Therefore, a *prima facie* case of obviousness has clearly not been established with respect to claim 9, and its dependent claims.

For the foregoing reasons, reversal of the final rejection of the above claims is respectfully requested.

2. Claims 13, 14.

Independent claim 13 was rejected as being obvious over the asserted combination of Agarwal and the APA. 6/29/2004 Office Action at 9.[2]

The Examiner cited APA as teaching the technology type determination module to report a technology of a storage device so that an initial error correcting code will be more appropriately selected. Applicant respectfully submits that there was no motivation or suggestion to combine the teachings of Agarwal and the APA to achieve the invention of claim 13. Agarwal relates only to detecting error rates on a wireless communications link, and there was no suggestion of any need or desirability of incorporating the teachings of the APA into the teachings of Agarwal. Also, although the background section of the present application states that the fundamental error rate of data storage media is dependent upon the technology type of the storage media, there was no discussion whatsoever of a technology type determination module to report a technology of a storage device as recited in claim 13. Thus, even if Agarwal and the APA can be properly combined, the hypothetical combination of Agarwal and the APA does not teach or suggest *all* elements of claim 13. A *prima facie* case of obviousness has thus not been established with respect to claim 13.

For the foregoing reasons, reversal of the final rejection of the above claims is respectfully requested.

3. Claim 16.

Claim 16, which depends from claim 13, was also rejected as being obvious over Agarwal and APA. Claim 16 is allowable for at least the same reasons as claim 13.

Moreover, with respect to claim 16, there is no teaching in either Agarwal or the APA of a storage device memory test module to perform a memory test on the storage device and to report to the update error correcting code assignment module. No mention is made in Agarwal of performing a memory test. The background section of the present application describes various factors that define the fundamental error rate. However, there is no mention in the background section of the present application of a storage device *memory test module* to perform a memory test on a storage device and to *report to the update error correcting code assignment module.*

Therefore, the hypothetical combination of Agarwal and the APA fails to teach or suggest all elements of the claim. A *prima facie* case of obviousness has not been established with respect to claim 16 for this additional reason.

Reversal of the final rejection of the above claim is respectfully requested.

4. Claim 17.

Claim 17, which depends from claim 13, was also rejected as being obvious over Agarwal and APA. Claim 17 is allowable for at least the same reasons as claim 13.

With respect to claim 17, neither Agarwal nor the APA refers to an application determination *module* to determine an application to which a storage device will be put and to *report to the update error correcting code assignment module.* Therefore, the hypothetical combination of Agarwal and the APA fails to teach or suggest all elements of the claim. A

[2] Although paragraph 5.7 on page 9 of the Office Action introduced claim 13 as being rejected under § 103 over Agarwal alone, the explanation text on page 9 of the Office Action actually also refers to "the Specs," which refers to the "admitted prior art." Thus, Applicant is treating the rejection of claim 13 as being over Agarwal and "admitted prior art."

prima facie case of obviousness has not been established with respect to claim 17 for this additional reason.

Reversal of the final rejection of the above claim is respectfully requested.

5. Claim 18.

Claim 18, which depends from claim 13, was also rejected as being obvious over Agarwal and APA. Claim 18 is allowable for at least the same reasons as claim 13.

With respect to claim 18, which depends from claim 13, neither Agarwal nor the APA refers to an error tracking, recording and analysis module to report information on errors made by a storage device to the update error correcting code assignment module. Therefore, the hypothetical combination of Agarwal and the APA fails to teach or suggest all elements of the claim. A *prima facie* case of obviousness has not been established with respect to claim 18 for this additional reason.

Reversal of the final rejection of the above claim is respectfully requested.

6. Claim 19.

Claim 19, which depends from claim 13, was also rejected as being obvious over Agarwal and APA. Claim 19 is allowable for at least the same reasons as claim 13.

With respect to claim 19, which depends from claim 13, neither Agarwal nor the APA describes an age and use tracking module to report information on an age and use level of a storage device to the update error correcting code assignment module. Therefore, the hypothetical combination of Agarwal and the APA fails to teach or suggest all elements of the

claim. A *prima facie* case of obviousness has not been established with respect to claim 19 for this additional reason.

Reversal of the final rejection of the above claim is respectfully requested.

7. Claims 20.

Independent claim 20 was rejected as being obvious over the asserted combination of Agarwal and APA. 6/29/2004 Office Action at 13.

As discussed above, no motivation or suggestion existed to combine Agarwal and the APA. Moreover, neither Agarwal nor the APA refers to the following combination of elements: an initial error correcting code assignment module; a technology type determination module; an application determination module; an update error correcting code assignment module; a storage device memory test module; an error tracking, recording and analysis module; an age and use tracking module; and an application tracking module. Thus, even if Agarwal and the APA can be properly combined, the hypothetical combination of references does not teach or suggest *all* elements of claim 20. A *prima facie* case of obviousness has thus not been established for at least the reasons set forth above.

Reversal of the final rejection of the above claim is respectfully requested.

VIII. CONCLUSION

In view of the foregoing, reversal of all final rejections and allowance of all pending claims is respectfully requested.

Respectfully submitted,

Date: Jan 14, 2005

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APPENDIX OF CLAIMS

The claims on appeal are:

3. A method, comprising:

associating an initial error correcting code with a redundancy defined within a data storage device; and

replacing the initial error correcting code with an updated error correcting code.

4. The method of claim 3, additionally comprising moving a divider, defined between the redundancy and a payload, to provide space required by the updated error correcting code within the redundancy.

5. The method of claim 3, additionally comprising reorganizing an address space shared by a payload and the redundancy to provide space required by the updated error correcting code within the redundancy.

6. The method of claim 3, additionally comprising performing a memory test on the data storage device to determine if the initial error correction code is of sufficient strength.

7. The method of claim 3, additionally comprising tracking errors made by the data storage device to determine if the initial error correction code is of sufficient strength.

8. The method of claim 3, additionally comprising tracking time and usage of the data storage device to determine if the initial error correction code is of sufficient strength.

9. A method comprising:

defining a payload and a redundancy within a storage device, the payload to the payload plus redundancy defining a ratio;

dynamically altering the ratio to change an amount of the redundancy;

tracking time and usage of the data storage to determine if the ratio results in sufficient redundancy.

10. The method of claim 9, additionally comprising:

performing a memory test on the data storage device to determine if the ratio results in sufficient redundancy.

11. The method of claim 9, additionally comprising:

tracking errors made by the data storage device to determine if the ratio results in sufficient redundancy.

13. A system, comprising:

a technology type determination module to report a technology of a storage device so that an initial error correcting code will be more appropriately selected;

an update error correcting code assignment module to assign an updated error correcting code to replace the initial error correcting code in response to a changed error rate; and

an error correcting code library containing at least two error correcting codes from which the update error correcting code assignment module may select.

14. The system of claim 13, additionally comprising an initial error correcting code assignment module to assign the initial error correcting code in response to an initial error rate.

16. The system of claim 13, additionally comprising a storage device memory test module to perform a memory test on a storage device and report to the update error correcting code assignment module.

17. The system of claim 13, additionally comprising an application determination module to determine an application to which a storage device will be put and to report to the update error correcting code assignment module.

18. The system of claim 13, additionally comprising an error tracking, recording and analysis module, to report information on errors made by a storage device to the update error correcting code assignment module.

19. The system of claim 13, additionally comprising an age and use tracking module to report information on an age and use level of a storage device to the update error correcting code assignment module.

20. A system, comprising:

an ECC library, containing at least two error correcting codes;

an initial error correcting code assignment module to assign an initial error correcting code from the ECC library appropriate to an expected initial error rate;

a technology type determination module to determine a technology of a storage device and to report the technology to the initial error correcting code assignment module;

an application determination module to determine an application to which the storage device will be put and to report to the initial error correcting code assignment module;

an update error correcting code assignment module to assign an updated error correcting code from the ECC library appropriate in response to a changed error rate;

a storage device memory test module to perform a memory test on the storage device and report to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made;

an error tracking, recording and analysis module to report information on errors made by the storage device to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made;

an age and use tracking module to report information on an age and use level of the storage device to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made; and

an application tracking module to report changes in an application to which the storage module is being used to the update error correcting code assignment module so that a decision to assign an updated error correcting code may be made.

21. A computer-readable medium having computer-executable instructions thereon which, when executed, perform acts comprising:

associating an initial error correcting code with a redundancy defined within a data storage device;

associating an updated error correcting code with the redundancy in response to a change in an error rate associated with the data storage device; and

moving a divider, defined between the redundancy and a payload within the data storage device, to provide space required by redundancy data associated with the updated error correcting code.

22. A computer-readable medium having computer-executable instructions thereon which, when executed, perform acts comprising:

monitoring an error rate of a storage device; and

dynamically altering a ratio of a redundancy to a payload to provide a level of redundancy appropriate to the error rate.

23. A method of initial error code correction assignment at a manufacturing facility, comprising:

locating a divider segregating a payload and a redundancy portion of a data structure in a storage device;

allocating the redundancy portion by moving the divider;

assigning an initial error code correction to the redundancy portion.

24. The method of claim 23 wherein the initial error code correction is assigned based at least in part on an initial determination of storage device technology, a memory test, and a determination of use to which the storage device will be put.

26. A method of updating an error code correction assignment for an end-use device, comprising:

determining a need to install a substitute error code correction assignment for the end-use device;

selecting the substitute error code correction assignment on an as-needed basis;

changing the location of a divider to accommodate the substitute error code correction for the end-use device,

wherein determining a need to install a substitute error code correction assignment includes tracking errors, monitoring media age and use levels, and performing self-testing to evaluate memory condition for the end-use device.

27. A method of determining an initial segregation between a payload and redundancy associated with a data structure of a storage device, comprising:

determining a technology type of the storage device;

performing a memory test on the storage device and recording a result of the memory test;

determining a use to which the storage device will be put;

selecting an error code correction based on the determinations and memory test;

segregating the data structure to accommodate the error code correction.

29. The method of claim 27 further comprising:

evaluating information corresponding to an error rate to determine if the error rate has increased;

reusing the storage device if the error rate is substantially constant; and

updating the error correction code if the error rate has increased beyond a threshold value.